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PROGRESS IN THE PRODUCTION OF HIGH-PROTEIN CORN.

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Read before the Academy, at Manhattan, November 27, 1903.

IN previous papers the author has presented some of the results obtained at the Kansas State Agricultural College Experiment Station in analyses of corn incident to efforts to obtain varieties containing higher percentages of protein than the analyses known at present. This paper will include most of the analyses made of corn grown in 1902. The results previous to that year have been published in bulletin No. 107 of the Experiment Station, and the numbers given to the different samples are the same as those used in that bulletin.

The samples are the progeny of crosses made in 1898 among a considerable number of varieties supposed to be superior. The policy has been to reject each year all showing less than two per cent. of nitrogen. As average corn contains but 1.84 per cent. of nitrogen, the minimum in that which we have propagated would be about ten per cent. above the average. The following table shows the percentages of nitrogen in the corn from individual ears analyzed in all but one variety, which was unexpectedly inferior, and has not been included.

Cross No.	No. of ear and percentages.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
76.....	2.10	2.30	1.85	1.69	1.83	2.14	1.88	1.88	2.23	2.09	.....	.....	.....	.....
92.....	1.99	2.15	2.34	2.22	2.02	2.53	1.87	2.07	2.22	2.38	.....	.....	.....	.....
138.....	2.11	2.60	.....	2.45	2.18	2.35	2.25	2.27	2.34	.....	.....	.....	.....	.....
322.....	1.69	1.77	2.39	1.93	1.99	2.23	1.99	2.13	2.17	2.16	.....	.....	.....	.....
401.....	2.11	2.33	2.15	2.14	1.87	2.00	2.04	2.25	2.18	2.01	.....	.....	.....	.....
417.....	2.16	2.05	2.23	2.13	.....	.....	2.23	1.82	2.18	.....	.....	.....	.....	.....
485.....	2.29	1.77	2.37	2.06	2.14	2.32	2.14	2.04	.....	2.21	.....	.....	.....	.....
487.....	2.08	2.08	2.14	1.62	1.76	2.10	1.78	.....	1.78	1.82	.....	.....	.....	.....
493.....	1.76	1.83	2.09	1.59	1.93	1.47	2.00	1.87	1.63	2.30	.....	.....	.....	.....
513.....	2.55	2.34	2.33	2.19	2.09	2.42	2.43	2.25	2.00	2.09	.....	.....	.....	.....
518.....	1.93	1.99	2.05	2.35	2.08	1.82	.....	.....	.....	.....	.....	.....	.....	.....
519.....	1.86	2.02	2.01	2.30	2.14	2.30	2.20	2.26	2.12	1.96	.....	.....	.....	.....
535.....	2.14	1.67	2.26	2.12	2.29	1.80	1.77	2.00	2.07	2.11	.....	.....	.....	.....
547.....	2.26	2.35	2.09	2.29	1.88	2.21	1.59	2.06	2.07	2.34	.....	.....	.....	.....
554.....	2.15	2.18	2.25	2.32	1.94	1.94	2.33	2.21	2.44	2.24	.....	.....	.....	.....
545.....	1.90	1.92	1.97	1.58	2.04	2.08	1.85	2.18	1.74	1.63	.....	.....	.....	.....
541.....	.....	2.05	1.61	2.12	1.19	1.82	2.60	2.09	2.07	2.21	1.78	2.15	2.63	1.96

The above table includes all of the analyses made in each case, and even a cursory examination will show the great superiority of many of the varieties over average corn. Of the 162 ears, only twenty were below 1.84 per cent. of nitrogen, and only fifty-one were below two per cent. of nitrogen. With a number of varieties none of the ears

are of low nitrogen content; *e. g.*, Nos. 138, 92, 513, 519, and 554. The average percentage of nitrogen in all of them is 2.07.

It is generally conceded that an increase in the nitrogen content of corn would be a material addition to its value, yet with all the attention that corn breeding and corn judging are receiving at present, comparatively little weight is given to chemical composition. The tendency is altogether too much in the direction of judging upon merely fancy points. Last summer determinations were made of the nitrogen present in each of the ears of a bushel of Reid's Yellow Dent corn. This is one of the best known and longest bred varieties, and is without doubt an excellent corn in many respects.

The following figures show the percentages of nitrogen in each of the eighty-two ears analyzed: 1.26, 1.34, 1.45, 1.46, 1.48, 1.49, 1.51, 1.51, 1.52, 1.52, 1.54, 1.54, 1.55, 1.55, 1.55, 1.55, 1.56, 1.56, 1.57, 1.57, 1.57, 1.58, 1.58, 1.58, 1.59, 1.59, 1.60, 1.60, 1.60, 1.60, 1.60, 1.61, 1.61, 1.61, 1.63, 1.63, 1.64, 1.64, 1.64, 1.64, 1.65, 1.67, 1.68, 1.68, 1.69, 1.69, 1.70, 1.70, 1.73, 1.73, 1.74, 1.75, 1.75, 1.77, 1.77, 1.78, 1.81, 1.83, 1.84, 1.85, 1.85, 1.91, 1.92, 1.92, 1.94, 1.95, 1.96, 1.97, 1.97, 1.98, 1.98, 2.00, 2.01, 2.02, 2.05, 2.06, 2.07, 2.10, 2.13, 2.17.

The average per cent. of nitrogen in the Reid's Yellow Dent was but 1.71, or about seven per cent. less than that of average corn. The importance of giving more attention to the composition of a great staple product, which is grown for its feeding value and not for ornament, could scarcely be more methodically presented than by the above figures.

The plan adopted by the Experiment Station at the beginning of this experiment has been criticized by some, it being alleged that stable varieties can never be produced by crossing. It seems to the writer, however, that the results given above show that in respect to nitrogen content, the single quality that has thus far been made the criterion for selection, the plan adopted seems to be abundantly vindicated. It thus remains for us to select from among those of high protein content the specimens which possess the most desirable other qualities.